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Broadband Network UP-Specific Information Suboption for the DHCP Relay Agent Option
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Abstract

This document defines a new Broadband Network UP-Specific Information suboption for the Dynamic Host Configuration Protocol's (DHCP) relay agent information option. The suboption allows the DHCP relay agent (Broadband Network CP) to include UP-specific information in the DHCP messages it forwards, to ensure that subscribers within the same SGRP under the same UP are assigned IP addresses from the same address space by the DHCP server.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

In the broadband network with CU separation, subscribers connecting via IPOE first send DHCP Request messages. These messages are sent via the AN to a group of UPs. UPs implement encapsulating the DHCP messages with a tunnel header, then send them to the CP. After successful authentication of the subscribers, the CP selects an appropriate UP to carry the subscriber' s services and acts as a DHCP Relay Agent to forward the DHCP Request messages to the DHCP SERVER to obtain an IP address.

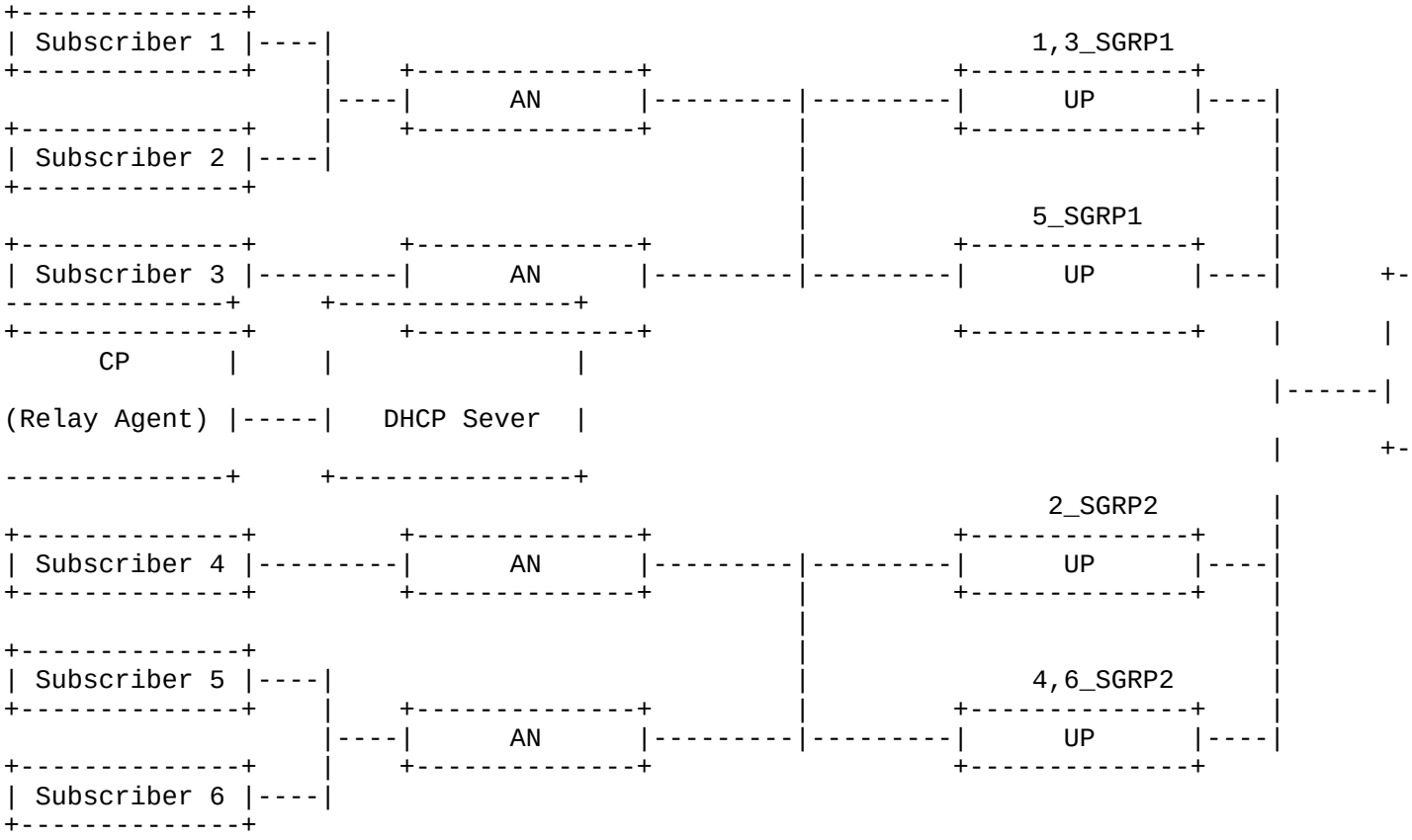

Figure 1: Broadband network diagram

However, since the DHCP server cannot know that subscribers are borne by different UPs, it may assign addresses from different address segments to different subscribers accessing through the same UP, which is not conducive to address aggregation on the UP. The best practice is that one SGRP on the specific UP should be assigned from the same address segment.

Therefore, this document adds a new suboption, enabling the CP to add SGRP information and UP information involved in the DHCP request message. After receiving the message, the DHCP server can divide the address pool into several continuous address segments, so that users accessing through the same UP can obtain addresses from the same address segment. In this way, the UP can maximize route aggregation when advertising prefixes to the IP core network, reducing the advertisement of /32 host routes.

2. Conventions and Definitions

The following terms and acronyms are used in this document:

* DHCP Relay Agent: This is a concept in all of the following protocols, although the details differ between them: BOOTP [RFC951] [RFC1542], DHCPv4 [RFC2131] [RFC2132], and DHCPv6[draft-ietf-dhc-rfc8415bis].

* Subscriber Group(or SGRP): Refers to group subscribers together that share states and resources; for example, subscribers sharing the same back-up state or subscribers sharing the same IP prefix.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 RFC2119 [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. Broadband Network UP-Specific Information Suboption

Format of the Broadband Network UP-Specific Information suboption:

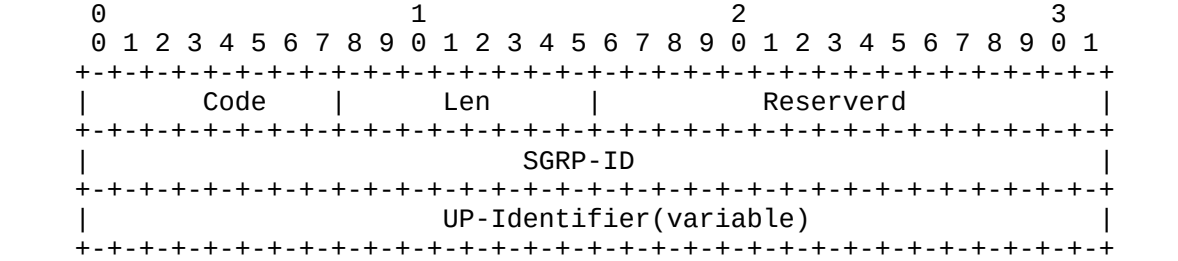

Figure 2: Broadband Network UP-Specific Information suboption Format

Where:

* Code: TBA

* Len: the number of octets in the sub-option (excluding the sub-option ID and length fields); the minimum length is 7.

* Reserved: Reserved fields, can be defined according to requirements in the future.

* SGRP-ID: the ID of SGRP, which is any integer value between 0 to 2^32-1

* UP-Identifier: the identifier of UP which is currently carrying the group of users corresponding to the aforementioned SGRP-ID

The SGRP-ID has to be stable. The CP (relay agent) SHOULD use a single identifier value consistently for a SGRP. The SGRP-ID used by a relay device SHOULD be comitted to stable storage, unless the relay device can regenerate the value upon reboot.

The UP-Identifier has to be stable and unique. If the UP-Identifier configured in a relay agent is not unique within its administrative domain, resource allocation problems may occur as the DHCP server attempts to allocate the same resource to subscribers behind two different UPs, then UPs can’ t implement ip prefix convergence. Therefore, a UP-Identifier configured in a relay agent MUST be unique within its administrative domain.

DHCP server attempts to allocate the same resource to subscribers behind two different UPs, then UPs can’ t implement ip prefix convergence. Therefore, a UP-Identifier configured in a relay agent MUST be unique within its administrative domain.

4. DHCP Relay Agent Behavior

DHCP relay agent (THE CP) MAY be configured to include a Broadband Network UP-Specific Suboption if the include a relay agent information option in relayed DHCP messages. The SGRP-ID strings themselves are preferred to be consistent with SGRP provisioning parameter. The UP-Identifier strings themselves can be a loopback address of UP or some other ID.

5. DHCP Server Behavior

This suboption provides additional information to the DHCP server. If it is configured to support this option, the DHCP server may use this information to 1) divide the address pool into a smaller block using the SGRP-ID and UP-Identifier as indexes, 2) allocate an address in the address block indexed by the SGRP-ID and UP-Identifier. There is no special additional processing for this suboption.

6. Security Considerations

TBD.

7. IANA Considerations

A registry is requested to be created for the sub-options in the option above.

8. Normative References

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[RFC2131] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, DOI 10.17487/RFC2131, March 1997, <https://www.rfc-editor.org/info/rfc2131>.

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[RFC3046] Patrick, M., "DHCP Relay Agent Information Option", RFC 3046, DOI 10.17487/RFC3046, January 2001, <https://www.rfc-editor.org/info/rfc3046>.

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